R E P O R T R E S U M E S

ED 012 681 RE 000 194

THE NATURE OF COMPREHENSION.
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PUB DATE JUL 66

EDRS PRICE MF-$0.25 HC-$0.72 18P.

DESCRIPTORS- *READING COMPREHENSION, *CONCEPT FORMATION, *CONCEPTUAL SCHEMES, INTELLECTUAL DEVELOPMENT, MENTAL DEVELOPMENT, PERCEPTION, *MODELS, PITTSBURGH

THE NATURE OF COMPREHENSION IS DEFINED AND CLARIFIED. THE LITERATURE IS SURVEYED TO SHOW THAT THE DEVELOPMENT OF CONCEPTS IS IMPORTANT IN INTELLECTUAL ACTIVITIES. IT IS POINTED OUT THAT CONCEPTS ARE BUILT FROM PERCEPTS, IMAGES, SENSATION, AND MEMORIES, AND THAT THE STEPS WHICH ARE EMPLOYED AS CONCEPTS ARE BUILT AND REFINED AND INCLUDE PERCEIVING, ABSTRACTING, AND FORMING GENERALIZATIONS. A MODEL INCLUDING PERCEPTION, APPERCEPTION, ABSTRACTION, APPRAISAL, IDEATION, AND APPLICATION IS PRESENTED TO EXPLAIN THE INTELLECTUAL PROCESSES. REFERENCES ARE INCLUDED. THIS PAPER WAS PRESENTED AT THE ANNUAL CONFERENCE AND COURSE ON READING (22D, UNIVERSITY OF PITTSBURGH, JULY5-15, 1966), AND PUBLISHED IN A REPORT OF THAT MEETING, "PROGRESS AND PROMISE IN READING INSTRUCTION," BY THE SCHOOL OF EDUCATION, UNIVERSITY OF PITTSBURGH, PITTSBURGH, PENNSYLVANIA 15213. (BK)

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A REPORT OF THE TWENTY-SECOND ANNUAL CONFERENCE AND COURSE ON READING

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The Nature of Comprehension

by

DONALD L. CLELAND

What is comprehension? The word has been defined in various ways. In the dictionary of education, it is defined as[1]

> The art of understanding the meaning of printed or spoken language as contrasted with the ability to perceive and pronounce words without reference to their meaning.

Yoakam[2] says that comprehension, "is a complex which involves the mental processes of recognition or association of meaning, evaluation of suggested meanings, selection of the correct meaning, and generalization based on the meanings of details involved in a context. Some writers would add the anticipation of meanings to this complex."

Nia B. Smith[3] has some interesting comments. Specifically, she says, "*comprehension* is just a big blanket term that covers a whole area of

thoughtgetting processes in reading." Interestingly, she gives some sage advice to teachers as she says; "Teachers need to be fully aware of the different mental processes involved in reading for meaning and to stand ready to aid their pupils in developing all of them."

Emerald V. Dechant,[4] again, emphasizes the complexity of the process of acquiring the meaning intended by the author. In fact, he says,

> The goal of all reading is the comprehension of meaning. The initial step in this process . . . is the association of an experience with a given symbol. This is absolutely necessary, but it is the most elemental form of comprehension. Complete meaning is not conveyed by a single word. The good reader learns to interpret words in their conceptual setting. He comprehends words as parts of sentences, sentences as parts of paragraphs, and paragraphs as parts of stories.
>
> Meaningful reading includes not only a literal interpretation of an author's words, but also an interpretation of his mood, tone, feeling and attitude. The reader must comprehend the implied meanings and prejudices of the writer. He must recognize summary statements, make inferences and applications, and see the broader implications of a passage. He must familiarize himself with the time and place in which the words were written. He must use the periods, commas, quotation marks, and questions as aids to interpretation.

We could go on, listing what the several writers and researchers in the area of language art have to say about this most important aspect of the total act of reading. It will do us good, though, just to mention or quote them. After much contemplation, each one of us must formulate his own definition. It must be an operational one — one that we understand and one which forms a matrix for our teaching.

On several occasions, I have defined reading as the *establishment of rapport with an author*. Thus a mutual bond of confidence exists between the reader and the author. The reader has, in fact, confidence that the author has couched his message in terms (words) that are understandable to the reader. The author, at the time of the writing, had confidence that he was conveying his thoughts in language patterns understandable to the intended audience. Therefore, if a person wishes to communicate with another person via the graphic or linguistic symbols we call words, he must encode these ideas — concepts, percepts, images, memories, sensations — into a signal system that will be meaningful. The reader or

listener, then, must decode these symbols into a signal system that is also meaningful. The more congruent these two signal systems, the more effective will be the communication: — Rapport will thus have been established. Such a relationship is premised upon a commonality of experience. Perfect comprehension, I fear, is unattainable. The reasons are obvious — the writer and reader as well as the speaker will differ in emotional maturity, experiential background, efficiency in thinking, skill in perceiving, language facility, etc.

Another definition of reading (reading and comprehension cannot be separated) that appeals to me is: the mental act of comprehending (or reading) may be thought of as a gestalt. Because of the configuration of main and supporting ideas, a meaning emerges. Take, for instance, the following six words which would be found in a second reader:

man, the, father, is, of, child

If we should rearrange these words as Wordsworth did in his poem, "My Heart Leaps Up," we would have:

The child is father of the man.

The meaning that is conveyed here is much more than an understanding of the meanings conveyed by each of the six words. The overused definition of a gestalt seems apropos — *The whole is greater than the sum of its parts*. And to paraphrase — the meaning conveyed by a series of linguistic symbols is greater than the sum of the meanings of the separate words.

Another definition that conveys a concept of comprehension is as follows: "Comprehension is the reorganization of the experiences back of the symbols." These linguistic symbols have no inherent meaning. They are words to which each of us attaches a certain portion of our experiential background. Words are words; objects are objects; things are things; events are events; relationships are relationships; and words are associated with each of them as we associate them. Reading, therefore, is a very individual and personal activity.

As suggested earlier, each of us who is engaged in organizing an optimal learning environment and judiciously manipulating it has a professional obligation to fulfill, i. e., he must, after much careful and critical thinking, formulate an operational defination of the complex intellectual process commonly known as comprehension. Here is mine:

> Comprehension — a central mental activity involving the higher intellectual processes, in which there is a reorganization of experiences relevant to the purpose of the reading, these experiences having been evoked by the linguistic symbols we call words.

By this time, I am sure you realize that there is no universally accepted defination of comprehension. Each in turn, as I mentioned previously, must formulate his own. It is imperative that this be done as our teaching will always reflect our concept of this complicated activity. Let us look at the findings of research and the interpretations given it by some of our best scholars.

Seven notable studies, using factorial analysis, have been completed in our attempt to isolate factors which are related to this intellectual activity. Five of the seven studies identified a *word* factor reflecting an understanding of the denotive meaning of a word. Six of the studies reveal a second verbal factor which probably measures the ability to understand the interrelationships among words or ideas. All of the studies disclosed a third factor in ascertaining the meaning intended by the author, namely, the analysis-synthesis of concepts. Therefore, these seven studies provide us with a matrix upon which we may build a concept of the term comprehenion.

Schoeller,[3] after examining the studies on reading comprehension, came to some interesting conclusion. Some of them pertinent to this discussion are as follows:

1. Comprehension improves gradually and steadily in normal pupils from first grade through college.
2. Ability to organize what has been learned through reading develops with maturation.
3. In the upper grades, comprehension increases faster than the speed of reading.
4. A developmental reading program based on the concept of child growth and development is supported by these conclusions.
5. Because it describes how a reader obtains a configuration of the main and supporting ideas of what is gleaned from the printed page, gestalt psychology appears to explain the reading process better than does bond psychology.

6. The majority of the evidence points out that comprehension can be improved better through a stimulation of central factors than through stimulation of peripheral factors.
7. Without accurate concepts of the words involved, a person will comprehend little or nothing of what he reads.
8. There is a continuous development of concepts as a child matures and his experience widens.
9. The number of concepts which a person knows is less important to his ability to comprehend than the accuracy, clarity, and organization of these concepts.
10. Sufficient experiences and opportunity must be provided pupils so that they can form clear, accurate, well-organized concepts about the things they are learning.
11. Etc.

It is interesting to note that the term concept appeared many times in the literature reviewed. This fact alone indicates its importance in the intellectual activities utilized in the establishment of rapport with an author or speaker.

It would seem appropriate, therefore, at this time to explore the nature of concepts, or more specifically, the ingredients that make up clear, accurate, and well-organized concepts.

Concepts, one of the main ingredients of the thinking process, are long agrowing. From the time that the kindergarten child expresses his definition of cats as "cats are so we can have kittens," to the mature adult who thinks of cats as sleek, cunning creatures of the wilds of India whose every movement is a symphony of motion, many experiences, both direct and vicarious, have contributed their share to this growing concept. The clarity, accuracy, and organization of a child's concepts are, perhaps, one of the best indicators of his probable success in the academic world, as well as what he knows, what he believes, what he does, and his ability to comprehend both the written and spoken word.

The word concept is used rather freely by both professional and lay people. A rather serious question can be asked: "Do they really understand what this graphic symbol means?" Many of us use it like a condiment to flavor our writing and speech. Perhaps, and because of its common use, it has lost its significance of being a meaningful stage in the development of understanding.

Much work has been done, however, in the study of concepts by those who are aware of their importance. Concepts have been defined in a variety of ways, but all of them seem to carry a common core. On the one hand, a person might say that they are the end products of inductive thinking, in which the child abstracts from related experience that which is relevant to the understanding of an idea previously obtained. It is a generalization based upon previous experience and perhaps that which a person is experiencing at any given moment. Concepts have been defined, on the other hand,[6] as the "cognitive organizing systems which serve to bring pertinent features of past experience to bear upon a present stimulus or object." Prior experience with objects, situations, events, relationships, etc., equips a person to react similarly to related kinds. Concepts, then, are more or less stabilized perceptions. In defining concepts, we would be identifying and defining ways in which experiences are organized in the mental construct.

Before continuing our explanation of concepts, I should like to offer the postulate that reading is thinking; and, furthermore, that concepts are the basic foundations of the thinking process.

David Russell,[7] in his definitive book, *Children's Thinking* (and parenthetically speaking, it is a must for every professional library), states that the materials of thinking are many and diverse. These may be classified as percepts, images, memories, sensations, and concepts. We can also assume that concepts are formed out of percepts, images, sensations, and memories. A suggested working formula for the formation of concepts can be equalized as follows:

> Concepts = environmental stimuli + percepts + understanding and generalization.

Both percepts and the more generalized concepts are the main materials of thinking, and according to our postulate, are employed in the intellectual processes involved in grasping the meaning intended by an author or speaker. When a person makes a generalization about related data, he has then developed a concept or a principle, a law, etc. This reflection is an internalized and verbalized label and is the end product to be reached in the creative thinking process. Concepts, then, are the basic foundations of the thinking process. The implication should be clear — creative thinking is the intellectual process by which new relationships are visualized or a new synthesis is made.

As was just stated, concepts are built up from percepts, images, sensations and memories. Perhaps an operational definition of these

terms will serve as a tenable base for a further discussion of concepts and a manner in which they are developed. Again, I will turn to the literature as a basis for our explorations.

1. PERCEPTS — may be thought of or defined as what is known of an object, an event, a quality, a situation, or a relationship as a result of sensory experience. It is more or less time bound — an awareness of present data, rather than a memory or an image or things past. It is part of an ever-changing mental activity linked to preceding sensations and subsequent mental activities. It does not exist in isolation but tends to be bolstered by other related sensory experiences. The classification of percepts that are learned by children would, I am sure, be of interest to you. We are indebted to Boring[8] and Boring, Langfield and Weld[9] for such a listing. The following is one classification.

   a. Percepts of form
   b. Percepts of space
   c. Percepts of time
   d. Percepts of movement
   e. Percepts of number
   f. Percepts of weight
   g. Social percepts
   h. Aesthetic percepts
   i. Humor percepts

2. IMAGES — an image is a centrally aroused experience related to previous perceptions and occurring in the absence of the initial stimulus. Since it always refers to a past event, it may be incomplete or inaccurate in comparison to the perception of the original experience. According to Russell,[10] children's images are of two general classes: *after* images and *memory* images. Some children, and a fewer number of adults, are able to retain particularly clear and vivid images for minutes or even hours after the sensory experience. These have been referred to as eidetic images. Children tend, on the whole, to have more vivid imagery than do adults. Since they may have some difficulty in distinguishing the real from the imaginary, their associative thinking may be frequently initiated by images that border on hallucinations.

3. SENSATIONS — a sensation is an awareness of some stimulus without much interpretation of it. Sensations are more complex than the so-called senses of touch, taste, smell, vision, and hearing. We also have a sense of position, movement, and equilibrium. Sensations are one of the raw materials of thinking, but they seldom exist as isolated experiences, because the child or adult interprets and integrates them to form a percept or percepts.

4. MEMORIES — the word memory is a generic term for experiences based upon previous experiences of the organism. Also, it might be said that it is the process of mental representation of at least a recognizable equivalent of the original experience. It may involve approximation of previous experiences, as when a person cannot remember the date an event happened but will date it before or after some other more vividly recalled experience. Memory is sometimes described as *rote memory,* or the exact reproduction without thought; and *logical memory,* where the reproduction is not exact, but meaningful relationships are maintained. As a generic term, memories may include percepts, images, sensations, and concepts. Memories are evoked as a result of some stimulus or a unique sequence of stimuli.

The inability to recall previous experiences, whether it was rote learning, or logical learning, may be described as forgetting. Some of us may be inclined to believe that learnings are forgotten as a result of the passage of time. Others claim that forgetting is due primarily to interference because of an intervening activity which is similar in nature, and that the degree of forgetting is in proportion to the congruency of the initial and intervening activity.

Concepts play such a vital role in the learning process. As has been indicated earlier, concepts are built of experiences, both direct and vicarious. The importance of direct experience cannot be overemphasized. Yet in the classroom, the teacher is compelled many times to use, to a more or less degree, vicarious experiences as she organizes and judiciously manipulates an optimal learning environment.

As has been stated, concepts play such an important role, not only in the learning process, but also in the act of comprehending. Let us at this time examine a process by which concepts may be built. Much like the thinking process or the act of reading, we have only shreds of evidence upon which to build a model. I am sure you understand the plight in which all of us find ourselves when we attempt to describe an abstract

process. We are victims of the *tyranny of words*. These, then, are the steps, not necessarily discrete, employed as concepes are built and refined.

1. Perceiving or Observing — the observer must perceive with a high degree of veridicality the object, the event, the situation or the relationship. Certain percepes are garnered as a result of the observation. Veridicality may be assured if answers to the following questions would be in the affirmative.
   a. Are the viewpoint and purpose of the observation clearly fixed?
   b. Was the observation casual or deliberate?
   c. Was there a briefing?
   d. Was the observer(s) in the appropriate physical and mental state?
   e. Was he/she competent to know what had been observed?
   f. Would other observers agree with this observer?
   g. Was the observation reported (a record made) soon after it was perceived?
   h. Was the observation firsthand?
   i. Did the percepes cohere with other facts?
2. Abstracting — this refers to the mental process by which related percepes are selected or identified. Also, images and memories are cut off from unrelated ones. The process of selecting a specific meaning from a generic meaning may be called abstraction. Again, the following guidelines may aid in determining the relative ness of the percepes, images, or memories.
   a. Were only related percepes selected?
   b. If images have been selected, were they differentiated from hallucinations?
   c. Were the images selected the product of autistic thinking? If so, were they relegated to their proper place?
   d. If memories were selected, did they fit into the context of the concept being developed?
   e. Were other concepts selected? If so, would they add to the clarity of the concept being developed?
3. Inductive Thinking or the Formation of a Generalization (Concept) — in this final step in the process of concept

formation, related data are integrated and a generalization (a concept) emerges. The clarity, accuracy, and organization of concepts may be assured if answers to the following questions are in the affirmative.

a. Were sufficient percepts, images, or memories selected?
b. Were they selected from a variety of situations?
c. Were they truly representative cases?
d. Were other concepts used?

What I have given you is theory. Perhaps a description of the manner in which the concept *justice* is developed may help to clarify your understanding of a concept. Credit must be given to David Russell for this schemata.[11]

PERCEPTS

a. Observation of municipal court and traffic cases.
b. Percepts and other concepts from social studies lessons and work with UNESCO with underdeveloped countries.
c. Observation of student government in school and administering students guilty of infraction of rules governing hall behavior.
d. Observation of parents assigning household chores to brothers and sisters.

MEMORIES

a. Bully on *playground, might is right.*
b. Mother dividing candy evenly.
c. Father showing impartiality in taking boys to baseball game.
d. Teacher giving all students equal chance to contribute to class discussion or activity.

IMAGES

a. Giving gifts to all poor families in child's own community at Christmas time.
b. Imagination influenced by Western TV show in which Marshall Dillon brings law and order to Dodge City.
c. Image created by listening to a description of a situation in which Babe Ruth visited every child in a hospital ward.
d. Image created by reading a true story in which the Hero sided with a wrongly accused Indian, being tried by a Kangaroo court, and ultimately was instrumental in freeing the Indian.

CONCEPTS

Other related concepts such as fair play, impartiality, square dealing, straight shooting, measure for measure, integrity, honor, etc.

You may think that I have gone far afield of my title, *The Nature of Comprehension;* if I have, it has been deliberate. In order to build a construct of the intellectual processes employed as a reader or listener acquires an intended meaning, I believe it is necessary first to understand the materials of raw ingredients of the act of comprehending. Hence, after searching the literature, I have attempted to relay to you the nature of percepts, images, memories, and possibly concepts, that form the basic ingredients of the thinking process, and, by taking an inductive leap, the intellectual processes of acquiring intended meanings from written or spoken language. One concept I hope you have acquired — *concepts are long growing.*

At long last, to borrow a phrase, I wish to present a *construct,* a model, which I believe, explains the intellectual processes that are employed as the reader or listener acquires an insight, a garnish of the meanings that are portrayed by the language of the author or the speaker. I'm sure it has shortcomings; please remember, though, that we have our shreds of evidence upon which to build the model.

I. PERCEPTION

The child must see closely the graphic or linguistic symbols we call words. These symbols have no inherent meanings; therefore, perception goes beyond the sensory response. As I have already said, words are words; objects are objects; events are events; situations are situations; and words are related to each of these as each perceiver relates them. Thus the critical element in perception is the meaningful response rather than simple recognition. There is the perception of the word, the phrase, the sentence, the paragraph, and the larger unit of meaning — the complete story or article. To help the reader to recognize emotionally loaded words or the effect an unsavory emotionalized attitude has on the perception gleaned, the teacher must be concerned with the acquisition of veridical percepts.

II. APPERCEPTION

Korzybski, the late semanticist, stated that reading was the reorganization of experiences back of the symbols. This definition would parallel and support one of the primary principles concerning the nature of

reading and learning to read, to wit, "meaning resides within the background experiences of the reader." Apperception, therefore, refers to the process of relating background experiences to the meanings couched in the language of author or speaker — it is perception characterized by clearness. Thus, percepts, images, or memories are evoked as a result of the words serving as stimuli. The reader brings to the page sufficient experiences which permit him to obtain an approximation of the experiences the writer or speaker is trying to convey. This is premised on the fact that the parties concerned, writer and reader, speaker and listener, must have had some commonality of experience.

III. Abstraction

This refers to the mental process by which the reader or listener neglects or selects percepts, images, or memories which are relevant to the purpose of reading or listening. Related concepts may also be selected at this stage. The process of selecting a specific meaning from a generic meaning may also, as I have stated earlier, be called abstracting. It should be re-emphasized that only those materials of thinking which are relevant to the purpose of reading should be abstracted. To your speaker, the memorization of a passage is not reading, nor is it thinking.

IV. Appraisal

This refers to the process of estimating the value or the validity of the aforementioned materials of thinking, according to accepted norms, standards or processes. This is one of the most critical steps in the model. It is also the most complicated. The veridicality of percepts, images, sensations, memories, and other related concepts cannot be overemphasized. This process of validation can range all the way from ascertaining if a fact is accurate to the complicated process of forming clear, concise, accurate and well-organized concepts. May I refer you to the guidelines suggested earlier in assuring the validity of concepts. If a chain is no stronger than its weakest link, in like manner, no concept is more valid than the validity of its ingredients, percepts, images and memories.

V. Ideation

From the validated gleanings secured as a result of the above steps — and I reinterject that these gleanings must always be related to the purpose or purposes in reading — a reader then uses them as the materials of reasoning in the following modes of thinking:

1. Inductive (generalizing) reasoning is that mode which proceeds from known data to a generalization, such as a hypothesis that

will explain the evidence at hand. A concept is the product of generalizing; a judgment or an opinion may also be the end product of inductive thinking. Laws or principles learned in science courses are generalizations formed by abstracting relevant data from complex masses of data. A prediction is a special form of inductive thinking as well as theorizing, in which a person builds a construct or a model to explain certain phenomena.

2. Deductive reasoning. As a process of reasoning, deduction consists of examining a particular situation or fact in the light of a generalization. A syllogism is an example of this mode of thinking; such as: "Nearly all boys can swim. Francis is a boy. Therefore, Francis probably can swim." A conclusion, a judgment, or an opinion may be the end product of this mode of thinking.

3. Critical thinking or reasoning. This mode of thinking proceeds on the basis of a careful evaluation of premises, facts, etc. and comes to conclusions cautiously through the consideration of all pertinent factors. Critical thinking or reading demands an interaction between the author and reader as well as between speaker and listener. Ascertaining cause and effect relationships makes maximum use of this mode of thinking. Detecting propaganda devices is another example of this high-level comprehension skill.

   Helping children to improve their critical reading abilities will challenge the best efforts of teachers as the children will need help in evaluating facts from which generalizations are made; in rendering a judgment on the clarity and organization of concepts that are used in building other concepts; in detecting the biases that authors may have; in recognizing propaganda techniques employed by subversive groups, in recognizing whether the author is capable of making sound and valid judgments; last and certainly not least, the reader must make a judgment as to whether or not his (reader) background and abilities permit him to make an unbiased judgment about the author's ideas.

4. Problem solving (scientific mode of thinking). This is, perhaps, the most directed of all thinking. It is really an embodiment of the four types listed above. When this type of thinking is manifested by a student, he or she is aware of some problems that must be solved, or a conflict that must be resolved. Five or six steps are usually listed when an attempt is made to describe the processes involved. These steps might be listed as follows:

a. The child's environment has made him *aware of a problem*, or a conflict arises between opposing sets of values. These situations stimulate his mental activity.

b. An *orientation* to the problem takes place. The child may start to think in one direction and then in another. At the same time, he may be gathering evidence to substantiate or refine earlier concepts or conclusions.

c. A tentative solution, or a *hypothesis* is formed as a result of the patterning of the several data. The Gestalt principle of *closure* may be emerging. The child, therefore, gets an insight into a possible solution.

d. An *evaluation* or a testing of the hypothesis then takes place. During this step, the tentative solution or hypothesis is subjected to the most critical examination. As a result, it is either accepted or rejected.

e. The selected solution, or hypothesis, is subjected to the *test of use*. This is the stage of verification.

3. Creative thinking. This is thinking at its highest level. Some would say that the ability to draw inferences is one aspect of creative reading. The making of new syntheses or seeing new relationships is another aspect of creative thinking. Still another product of creative thinking is a critical reaction to a treatise on a controversial issue.

VI. Application

If the proof of the pudding is in the eating, in like manner, the effectiveness of a reading program is determined largely by the functional uses readers make of the new ideas acquired. They broaden experiences, increase understandings, and enable one to learn how to engage in many kinds of activities which would otherwise be unknown to him. If students are given aid as they formulate purposes for reading a particular selection, enhancement of the utilitarian aspects of reading will occur.

In my presentation this afternoon, I have explored and shared with you my understanding of the nature of comprehension. As a matrix for my model, I have relied heavily on the literature. You will recognize, I am sure, that I have made some inductive leaps, made some educated guesses. You, each of you, can do no less. You have a professional re-

possibility to become as articulate as possible with the nature of comprehension. You must build a construct or a model of the intellectual processes employed as the child or reader derives the intended meaning from the linguistic symbols we call words — you may call this process, the establishment of rapport with the author or speaker; or gaining insight; a Gestalt, if you please; or the reorganization of experience back of the symbols; or a more sophisticated definition of the reading process.

When has a child comprehended? Let me give you one example. When the farm boy understands sheep — when he knows that they, when drinking, insert their noses deeply into a container of clear, cool water so that some spills over the side — then he understands that portion of the 23rd Psalm, which reads, *My cup runneth over.*

FOOTNOTES

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10. Russell, *op. cit.*
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